

## Organic Polymers Template for a Very Peculiar Mineral in Biofilm

High-resolution synchrotron spectromicroscopy and electron microscopy reveal that microbially produced polysaccharides template the crystallization of unprecedented pseudo-single crystals of akaganeite with aspect ratios of approximately 1:1:1000. Biological systems can produce extraordinary inorganic structures and morphologies. The mechanisms of synthesis are poorly understood, but of great interest for engineering novel materials. Chan, De Stasio and collaborators used x-ray photoelectron emission spectromicroscopy (X-PEEM) to show that microbially-generated 100 nm diameter FeOOH filaments contain polysaccharides, providing an explanation for the formation of akaganeite pseudo-single crystals 2 nm wide and many microns long (Figures 1 and 2). They infer that the cells extrude the polysaccharide strands to localize FeOOH precipitation in proximity to the cell membrane to harness the proton gradient for energy generation. Characterization of organic compounds with high spatial resolution, correlated with mineralogical information, could revolutionize our understanding of biomineralization mechanisms.

